

Appl. No. 10/680,043
Amdt. dated August 3, 2005
Reply to Office action of March 14, 2005

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-5 (canceled).

6. (currently amended) A gear system according to claim [5] 25 wherein the race sleeve is welded to the head of the carrier pin and the initially separate rib ring is welded to the race sleeve.

7. (original) A gear system according to claim 6 wherein the race sleeve is formed from case carburized steel.

8. (currently amended) A gear system according to claim [5] 25 wherein head has a large and small segment, with the large segment being closest to the shank; wherein the race sleeve has a bore which receives the large segment of the head on the pin and a reduced bore which receives the small segment of the head on the pin; and wherein the rib ring fits over the small segment of the head on the pin and captures the sleeve on the pin.

9. (original) A gear system according to claim 8 wherein the race sleeve as formed from through hardened steel.

10. (currently amended) A gear system according to claim [2] 25 wherein the intermediate section has a cylindrical surface that forms the bottom of essentially the entire groove.

11. (currently amended) A gear system according to claim [1] 25 wherein the intermediate segment has a conically shaped surface that leads away and tapers downwardly from the shank.

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12. (original) A gear system according to claim 11 wherein the intermediate segment also has a cylindrical surface that leads away from the small end of the conical surface and extends toward the head.

13. (currently amended) An epicyclic gear system comprising:

a sun gear located along a central axis;

a ring gear located around the sun gear and sharing the central axis with the sun gear;

at least one planet gear located between and engaged with the sun and ring gears for rotation about an offset axis, the planet gear carrying a raceway that is presented toward the offset axis;

a carrier coupled to the planet gear and including a carrier flange located beyond one end of the planet gear, the carrier also including a carrier pin that extends from the carrier flange through the planet gear and has a shank at which it is anchored in the carrier flange and a head located beyond the carrier flange and a groove separating the shank and the head, such that the pin is cantilevered from the carrier flange,

an inner race which is attached to the head of the pin and extended back over, yet spaced from, the pin at the groove, such that the inner race is cantilevered from the pin, the inner race being within the planet gear where it is provided with a raceway that is presented away from the offset axis and toward the raceway on the planet gear; and

rolling elements organized in a row between and contacting the raceways of the planet gear and inner race.

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14. (original) A gear system according to claim 13 wherein the raceway on the planet gear is one of two outer raceways which are located oblique to the offset axis and are inclined in opposite directions; wherein the raceway on the inner race is a one of two inner raceways that are oriented oblique to the offset axis and inclined in opposite directions, one of the inner raceways being located within and inclined in the same direction as one of the outer raceways and the other inner raceway being located within and inclined in the same direction as the other outer raceway; and wherein the rolling elements are arranged in two rows between the outer and inner raceways.

15. (original) A gear system according to claim 14 wherein the raceways are tapered; wherein the outer raceways taper downwardly toward each other, so that they are closest at their small ends; wherein the inner raceways taper downwardly toward each other so that they are closest at their small ends; and wherein the rolling elements are tapered rollers.

16. (currently amended) A gear system according to claim 15 wherein the inner race includes a race sleeve that fits over and is fastened to the head of the pin; and has the two inner raceways and also a thrust rib at one end of the sleeve where it is at the large end of one of the inner raceways; and wherein the inner race also includes an initially separate rib ring which fits against the opposite end of the sleeve and has thrust rib located at the opposite large end of the other inner raceway.

17. (currently amended) An epicyclic gear system comprising:
a sun gear located along a central axis;

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a ring gear located around the sun gear and sharing the central axis;

at least one planet gear located between and engaged with the sun gear and ring gear;

a carrier flange located beyond one end of the planet gear;

a carrier pin extended from the carrier flange and through the planet gear along an offset axis, such that it is cantilevered on the flange, and including a shank at which the pin is anchored on the flange and a head located beyond the shank, the pin having an annular groove located between the shank and the head; and

a bearing located between the pin and the planet gear and including an inner race attached to the head of the pin and extended over, yet spaced from the pin at the groove such that the inner race is cantilevered from the head of the pin, the inner race having an inner raceway that is presented outwardly away from the offset axis, the bearing also including an outer raceway carried by the planet gear and presented inwardly toward the inner raceway, the bearing further including rolling elements located ~~between the end~~ and contacting the inner and outer raceways.

18. (original) A gear system according to claim 17 wherein the outer raceway is one of two outer raceways which are located oblique to the offset axis and are inclined in opposite directions; wherein the inner raceway is one of two inner raceways that are oriented oblique to the offset axis and inclined in opposite directions, one of the inner raceways being located within and inclined

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in the same direction as one of the outer raceways and the other inner raceway being located within and inclined in the same direction as the other outer raceway; and wherein the rolling elements are arranged in two rows between the outer and inner raceways.

19. (original) A gear system according to claim 18 wherein the raceways are tapered; wherein the outer raceways taper downwardly toward each other, so that they are closest at their small ends; wherein the inner raceways taper downwardly toward each other so that they are closest at their small ends; and wherein the rolling elements are tapered rollers.

20. (original) A gear system according to claim 18 wherein the inner race includes a race sleeve that fits over and is fastened to the head of the pin and has the two inner raceways on it and also a thrust rib at one end of the sleeve where the rib is at the large end of one of the inner raceways; and wherein the inner race also includes an initially separate rib ring which is located at the opposite end of the race sleeve and has a thrust rib located at the large end of the other inner raceway.

21. (original) A gear system according to claim 20 wherein the race sleeve is welded to the head of the carrier pin and the initially separate rib ring is welded to the race sleeve.

22. (currently amended) A gear system according to claim 20 ~~wherein~~ wherein the head has large and small segments with the large segment being closest to the shank; wherein the race sleeve has a bore which receives the large segment of the head on the pin and a reduced bore which receives the small

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segment of the head on the pin; and wherein the rib ring fits over the small segment of the head on the pin and captures the sleeve on the pin.

23. (original) A gear system according to claim 17 in which the bottom of the groove is formed substantially in its entirety by a cylindrical surface located between the shank and the head.

24. (original) A gear system according to claim 17 in which the bottom of the groove is formed by a conical surface leading away from the shank, from which it tapers downwardly, and a cylindrical surface leading from the small end of the conical surface to the head.

25. (new) An epicyclic gear system comprising:

a sun gear located along a central axis;

a ring gear located around the sun gear and sharing the central axis with the sun gear;

at least one planet gear located between and engaged with the sun and ring gears for rotation about an offset axis, the planet gear having two raceways that are tapered and presented toward the offset axis, the raceways being oblique to the axis and tapered downwardly toward each other so that they are closest at their small ends;

a carrier coupled to the planet gear and including a carrier flange located beyond one end of the planet gear, the carrier also including a carrier pin that extends from the carrier flange, along the offset axis, through the planet gear and has a shank at which it is secured to the carrier flange, an intermediate segment extended from the shank, and a head attached to the intermediate

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segment and projecting radially beyond the intermediate segment, whereby the pin is cantilevered from the carrier flange;

an inner race attached to the head of the pin and extended back over, yet is spaced from, the intermediate segment of the pin, so that the inner race is cantilevered from the pin, the inner race being within the planet gear and including a race sleeve that fits over and is fastened to the head of the pin, the race sleeve being provided with two raceways that are tapered and oblique to the offset axis and are presented away from the offset axis and toward the raceway on the planet gear, one of the inner raceways being located within and inclined in the same direction as one of the outer raceways, the other of the inner raceways being located within and inclined in the same direction as the other of the outer raceways so that the inner raceways are closest at their small ends, the race sleeve further having a thrust rib at its one end where the rib is located at the large end of one of the inner raceways, the inner race also including an initially separate rib ring which is located at the opposite end of the race sleeve and has a thrust rib located at the large end of the other inner raceway; and

tapered rollers organized in two rows between and contacting the outer raceways of the planet gear and the inner raceways of the inner race.

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